Building a Microbial Fuel Cell

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Background and Motivation

- IMSA offers an “Engineering” class—a one-semester, project-based class, in which students apply concepts and principles of science in constructing their projects.
- Create an alternative energy module which
  - Addresses the four Engineering NGSS standards, and
  - addresses global issues such as energy supply and demand, climate change, and CO_2 emissions.
- Break project into two phases (alpha and beta) to show students how engineering projects are phased into process development and scale-up, with optimization occurring all along the way.

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Benefits of Microbial Fuel Cell (MFC) Option

- Students are exposed to:
  - Wide variety of concepts (power vs energy, Ohm's law, galvanic cells)
  - Assessing environmental impact (CO_2 emissions, ecological and community impacts, etc.)
  - Test equipment (voltmeters, ammeters)
  - 2 phase projects (alpha and beta)
  - Written and oral reports

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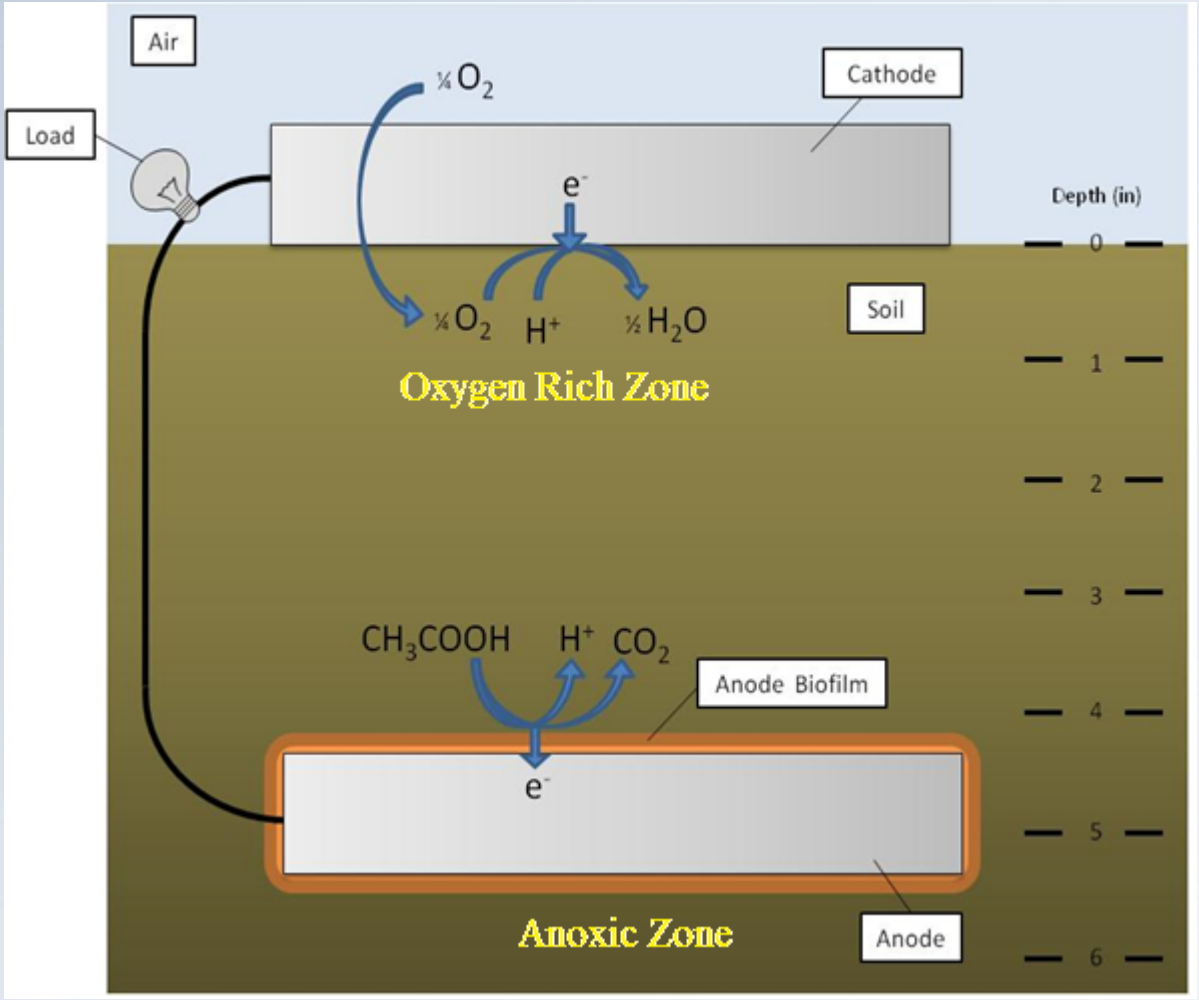
Workshop Focus

- Explore the function and construction of MFC



Taken from “Advanced Intro to MFC’s”, keegotech.com (2011)

Potential MFC Construction Pitfalls

- Moisture content of soil
  - Maintain moisture with lid
- Shorting of wires
  - Ensure top cathode contact with soil
  - Avoid short circuits between electrodes.
- Soil/microbial nutrients and additives
  - Sugary foods drinks can increase voltage, but beware of noxious-smelling byproducts
- Maintaining anoxic and oxygen-rich zones
  - Avoid air pockets during assembly
  - Iron (steel wool/nails) is good oxygen scavenger

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